

REMARKS

In the last Office Action, claims 1 and 2 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,021,630 to Higashi et al. ("Higashi") in view of U.S. Patent No. 4,282,652 to Ballas ("Ballas").

By the present response, the specification has been suitably revised to correct minor informalities. Claims 1 and 2 have been amended in formal respects to improve the wording and place them in better conformance with U.S. practice. New claims 3-13 have been added to provide a fuller scope of coverage.

Applicants respectfully submit that claims 1-13 patentably distinguish over the prior art of record.

The present invention relates to a vegetation cutting apparatus having an improved grip mounting structure for mounting a grip to a handle of the cutting apparatus.

As described by applicants at page 2 of the specification, known methods employed to reduce the transmission of motor vibration to handgrips of vegetation cutting machines rely upon the use of vibration-absorbing handgrips. However, vibration-proof members absorb vibration only in a longitudinal direction of the handle and do not reduce vibration applied in other directions. Further, such handgrips are complicated in structure.

The present invention provides a vegetation cutting apparatus which has a simplified arrangement for effectively reducing vibration transmitted from a handle to a grip of the cutting apparatus with increased efficiency.

According to one aspect of the present invention, the inventive vegetation cutting apparatus has an elongated operation rod, a motor mounted to a proximal end of the rod, a drive shaft extending through the rod and driven by the engine, a cutting tool provided at a distal end of the operation rod to undergo rotation with the drive shaft, a handle comprised of a bar attached at a fixing point to the operation rod between the engine and the cutting tool, and right and left handgrips mounted to distal ends of the bar each grip being mounted at or proximate to a center of gravity of a sum of a mass of the respective handgrip and a portion of the bar extending between the fixing point and the distal end of the bar.

When vibration is transferred to a bar provided with a knot or a flange, the amplitude of the vibration is greatly diminished at the knot or flange. The present inventors have discovered that the same phenomenon occurs at or near the center of gravity of the bar. Thus, in accordance with the present invention recited by independent claims 1 and 8, the handgrips are provided at or proximate to the center of

gravity of the sum of masses described above so that the amplitude of vibration transferred from the handle to the handgrips is small. Vibration transferred from the bar to the handgrips can thus be diminished with an increased efficiency without requiring a complex arrangement.

In the embodiment shown in Fig. 1 of the application drawings, the vegetation cutting machine 10 has a pipe-shaped operation rod 11, an engine 14 mounted to a base portion 13 of the operation rod 11, and a disc-shaped cutting tool 16 carried at a distal end 15 of the operation rod 11. A drive shaft 12 is incorporated within the operation rod 11 and is rotated by the drive power of the engine 14. Rotation of the drive shaft 12 causes the cutting tool 16 to rotate. A U-shaped handle 18 for operating the cutting machine 10 is fixedly secured to the operation rod 11 at an intermediate portion thereof between the engine 14 and the cutting tool 16 via a handle holder 19.

The handle 18 is comprised of a bar having left and right portions provided with handgrips 20, 30. The right handgrip 30 has a throttle lever 41 for controlling the motor 14 and a lock lever 42.

Vibration caused by operation of the motor 14 is transferred to the operator via the handle 18 and through the handgrips 20, 30. In particular, since the cutting machine 10

compels the motor 14 to rotate the cutting tool 16 via the drive shaft 12, vibration transferred to the handgrips 20, 30 from the operation rod 11 via the handle 18 generally has a large amplitude in a rotational direction. The present invention reduces vibrations in such a direction as much as possible by employing the following structure.

As shown in Fig. 4, a portion of the handle 18 extending from a fixing point PL1 on a left side of the handle holder 19 has a mass of $mL1$ (hereinafter referred to as "left handle mass $mL1$ "), while the left grip 20 has a mass of $mL2$ (hereinafter referred to as "left grip mass $mL2$ "). The total mass of the left side is $mL3$, which is the sum of the left handle mass $mL1$ and the left handgrip mass $mL2$ ($mL3 = mL1 + mL2$). The sum $mL3$ of the left side mass has a center of gravity as at GL . The present invention is characterized in that the left grip 20 is mounted to the handle 18 at its center of gravity GL corresponding to the sum of the left side mass $mL3$, or at a position proximate thereto. The right handgrip has a similar structure.

In addition, the grips have escape portions formed in areas except for mount portions to be fixed to the handle for preventing other portions from being brought into contact with the handle. Since the grips are kept out of contact with the handle at the areas remote from the mount portions, there

is no chance for vibrations of large amplitude to be transferred from the handle to the grips. As a result, the grips can be maintained in a condition wherein the least vibrations are transferred from the handle.

No corresponding structure is disclosed or suggested by the prior art of record.

Higashi discloses a bush cutting machine 10 having a pipe-shaped operation rod 15, an engine 13 mounted to a proximal end of the operation rod, a transmission shaft 16 extending through the operation rod 15 and driven by the engine 13, a cutting tool 14 provided at a distal end of the operation rod 15 and rotated by the drive shaft 16, a bar-shaped handle 17 fixed to an arbitrary position of the operation rod 15 between the prime mover 13 and the cutter 14, and a right grip 20 and a left grip 18 mounted to distal ends of the handle 17.

However, Higashi does not disclose or suggest mounting of the handgrips in a position in close proximity to the claimed center of gravity. Nor does Higashi disclose or suggest the claimed escape portions.

Ballas does not cure the foregoing defects. Ballas discloses a handle assembly 21 connected to a center of gravity of a vegetation cutting apparatus. However, Ballas does not disclose or suggest handgrips mounted to a center of

gravity of the handle. Thus, modification of Higashi in view of Ballas would not have yielded the claimed invention.

In particular, Ballas discloses a vegetation cutting apparatus having a motor 17 and a rotating cutting head 14 mounted at opposite ends of a support tube 12. A handle assembly 21 comprised of first and second tubular handle members having cylindrical handgrips at their free ends are secured by a clamp 24 to a straight portion 13 of the support tube 12. The handle members have straight and curved portions arranged in combination so that the handgrips reside in a common horizon and with substantially the same angular displacement at the user's hands with the cutting head positioned directly in front of the user's body so that the user has a comfortable stance with the cutting head and can make equal left and right swings without any undue strain or effort during vegetation cutting. The handles 22 and 23 are mounted proximate a center of gravity of the apparatus.

More specifically, the distribution of mass provided by the motor 17, the support tube 12 and the cutting head 14 produces a center of gravity along the straight portion 13 of the support tube 12. The handle assembly 21 is connected to the support tube 12 along this center of gravity so that the handgrips reside closely adjacent the center of gravity.

Contrastingly, the cutting apparatus of the present invention has a bar-shaped handle fixed to an operation rod and right and left hand grips mounted to distal end portions of the handle, each of the grips being mounted at or proximate to a center of gravity of a sum of a mass of a handle portion between a fixing point and a respective one of the distal ends of the handle and a mass of the respective grip.

Nor do Higashi or Ballas disclose or suggest that each of the grips has a single mount portion, directly connected to a respective one of the distal end portions of the handle and located at the center of gravity of the sum of the mass of the handle portion and the mass of the grip.

A claim rejection based upon obviousness under 35 U.S.C. §103 must be supported by an evidentiary basis establishing the obviousness of each and every limitation in each rejected claim. The Examiner may do this by citing a reference which directly establishes this lack of novelty, or, the Examiner may otherwise set forth a line of reasoning consistent with and motivated by the cited art establishing that such limitations would have been obvious. There must be some teaching, reason, suggestion, or motivation found in the prior art or in the prior art references to make a combination which renders an invention obvious within the meaning of 35 U.S.C §103. See, e.g., Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d 982, 989, 18 USPQ2d 1885 (Fed. Cir. 1991).

In order to set forth a prima facie case of obviousness, the Examiner must not only demonstrate that this teaching exists in the prior art, but that it would teach all limitations of the claim. This burden cannot be met by citing references that, even if combined, fail to teach explicitly recited limitations.

Stated otherwise, in rejecting a claim as obvious under 35 U.S.C §103, the Examiner cannot simply rely on a combination of references that teach some limitations of the claim, and make mere conclusory allegations that the combination teaches others as well.

In the instant case, the Examiner has not met his burden of establishing a prima facie case of obviousness as discussed above. There is nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the Examiner. As pointed out above, the cutting apparatus of the present invention recited by amended independent claim 1 and newly added independent claim 8 has a handle comprised of a bar mounted at a fixing point to an operation rod and right and left handgrips mounted to distal end portions of the bar, each of the handgrips being mounted at or proximate to a center of gravity of a sum of a mass of a portion of the bar between the fixing point and a respective one of the distal ends and a mass of the respective

handgrip. The combined teachings of the cited references would not have suggested the claimed configuration.

Accordingly, applicants respectfully submit that amended claims 1 and 2 and newly added claims 3-13 patentably distinguish over the prior art of record and that the rejections under 35 U.S.C. §103(a) should be withdrawn.

In view of the foregoing amendments and discussion, the application is now believed to be in condition for allowance. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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